



ABSTRACT

Novel structure of the optical elements (i.e. filter) to be operated in the long, mid, and near infrared wavelengths of lights is provided. The filter can offer very narrow linewidth, and high reflectivity (or transmissivity) at the peak wavelength. The optical element consists of the substrate, first diffraction grating and single uniform surface, and the second grating. Alternatively, the optical element again consists of the substrate, single uniform surface and the diffraction grating on the top of it. Alternatively, filter may also consist of number of sequence of layers, wherein each sequence comprises the single uniform layer sandwiched by the two diffraction grating layers. Filter again alternatively consists of the number of sequences wherein each sequence comprises the single uniform layer and the single diffraction grating. Diffraction grating may be two-step grating or multilevel grating with synchronously or nonsynchronously samples diffraction gratings.